material placement head **36** in a pre-programmed route over the structure **24**, and may also include optimization routines for optimizing the head movement. The software programs **114** may also include programmed instructions for determining the length of tape **20** to be dispensed and the timing of when to cut the tape **20**. The computer may further include programmed instructions for calculating the placement and the number of strips **26** of tape **20** required to cover structure **24** within the outer boundaries **25**, which may be based on use of tape **20** having a specific width "W" (FIG. **1**).

Operator input/output controls **118** may allow an operator to program the computer **110** and alter the software programs **114** as required. Data such as part numbers and other information relating to the structure **24** or the operation of the material placement head **36** may be stored in a memory **116**. Also, the memory **116** can be used to store the outer boundaries **25** (FIGS. **1** and **2**) of an application area **22** on the structure **24** for a particular part number, as well as the programmed path that the material placement head **36** uses to travel in order to cover the application area **22** with strips **26** of the tape **20**. Sensors **112** may be provided which provide signals to the computer **110** relating to the sensed position of the robotic device **38** as well as the status of functions carried out by the material placement head **36**.

FIG. **17** illustrates the overall steps of a method for installing damping material on a structure. As shown at step **120**, the material placement head **36** is moved over the structure **24**. The material placement head **36** is used to place damping material, such as the tape **20**, on the structure **24** as the material placement head **36** moves over the structure **24**, as shown at step **122**.

FIG. **18** illustrates additional details of the method broadly shown in FIG. **17**. Beginning at step **124**, the outer boundaries **25** of an application area **22** on the structure **24** are determined, which will normally be established in digital form. Next, at step **126**, the number and placement of strips **26** of tape **20** required to cover the application area **22** within the outer boundaries **25** may be calculated by the computer **110**, which may be based on use of a tape **20** having a specific width "CW" (FIG. **1**). At step **128**, the computer **110** (FIG. **16**) is programmed to control the movements of the material placement head **36**, based on the number and placement of the strips **26** of tape **20** calculated at step **126**. At step **130**, a spool **54** of tape **20** is loaded onto the material placement head **36**.

At step **132**, tape **20** is dispensed from the spool **54** and the material placement head **36** is moved along a path that has been programmed in the computer **110** at step **128**. As the tape **20** is being dispensed from the spool **54**, the lower backing **30***b* is separated and accumulated on the take-up spool **70**, as shown at step **134**. As the tape **20** is being dispensed and fed to the compaction roller **48**, the tape **20** is compacted against the structure **24**, as shown at step **136**. At step **138**, the tape **20** being placed is cut to length for each strip in strips **26**.

Embodiments of the disclosure may find use in a variety of potential applications, particularly in the transportation industry, including for example, aerospace, marine and automotive applications. Thus, referring now to FIGS. **19** and **20**, embodiments of the disclosure may be used in the context of an aircraft manufacturing and service method **150** as shown in FIG. **19** and an aircraft **152** as shown in FIG. **20**. During pre-production, manufacturing and service method **150** may include specification and design **154** of the aircraft **152** and material procurement **156** in which the disclosed method may be specified for use in applying damping materials on components. During production, component and subassembly manufacturing **158** and system integration **160** of the aircraft **152** takes place. The disclosed method and apparatus may be used to place damping materials on components that are later assembled and integrated with other subassemblies. Thereafter, the aircraft **152** may go through certification and delivery **162** in order to be placed in service **164**. While in service by a customer, the aircraft **152** is scheduled for routine maintenance and service **166** (which may also include modification, reconfiguration, refurbishment, and so on). Components having damping material applied thereto according to the disclosed embodiments may be used to replace components on the aircraft **152** during the maintenance and service **166**.

Each of the processes of manufacturing and service method **150** may be performed or carried out by a system integrator, a third party, and/or an operator (e.g., a customer). For the purposes of this description, a system integrator may include without limitation any number of aircraft manufacturers and major-system subcontractors; a third party may include, without limitation, any number of vendors, subcontractors, and suppliers; and an operator may be an airline, leasing company, military entity, service organization, and so on.

As shown in FIG. **20**, the aircraft **152** produced by manufacturing and service method **150** may include an airframe **168** with a plurality of systems **170** and an interior **172**. Examples of high-level systems **170** include one or more of a propulsion system **174**, an electrical system **176**, a hydraulic system **178**, and an environmental system **180**. Any number of other systems may be included. Although an aerospace example is shown, the principles of the disclosure may be applied to other industries, such as the marine and automotive industries.

Systems and methods embodied herein may be employed during any one or more of the stages of the manufacturing and service method **150**. For example, components or subassemblies corresponding to manufacturing and service method **150** may be fabricated or manufactured in a manner similar to components or subassemblies produced while the aircraft **152** is in service. Also, one or more apparatus embodiments, method embodiments, or a combination thereof may be utilized during the component and subassembly manufacturing **158** and system integration **160**, for example, by substantially expediting assembly of or reducing the cost of an aircraft **152**. Similarly, one or more of apparatus embodiments, method embodiments, or a combination thereof may be utilized while the aircraft **152** is in service, for example and without limitation, to maintenance and service **166**.

Although the embodiments of this disclosure have been described with respect to certain exemplary embodiments, it is to be understood that the specific embodiments are for purposes of illustration and not limitation, as other variations will occur to those of skill in the art.

What is claimed is:

1. An apparatus for placing damping material on a structure, comprising:

a tape holder configured to hold the damping material, the damping material comprising a tape having continuously adhesive surfaces on both sides of the tape and, prior to placement on the structure, the tape includes a first backing on a first side of the tape and a second backing on a second side of the tape;

a first take-up roll disposed to one side of the tape as the tape is dispensed from the tape holder, the first take-up roll configured to receive the first backing as the first backing is removed from the tape during placement;

a second take-up roll disposed to an opposite side of the tape relative to the one side as the tape is dispensed from the tape holder, the second take-up roll configured to